



SEQUENCE LISTING

<110> Stephen M. Allen
Gary M. Fader
Saverio Carl Falco
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Jonathan E. Lightner
Guo-Hua Miao
J. Antoni Rafalski
Catherine J. Thorpe

<120> Plant Cellulose Synthases

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RECEIVED

NOV 07 2002

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 Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Ala Ala Asn Phe Val Arg
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 Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile
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 Asn Ala Leu Val Ala Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr
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Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Val	Arg	Asp	His	Pro		
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Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	Gln	Ser	Gly	Gly	Leu	Asp	Cys	Glu		
			500					505					510				
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Gly	Tyr	Asn	His	His	Lys	Lys	Ala	Gly	Ala	Met	Asn	Ala	Leu	Val	Arg		
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Val	Ser	Ala	Val	Leu	Thr	Asn	Ala	Pro	Tyr	Leu	Leu	Asn	Leu	Asp	Cys		
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Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Ile	Lys	Glu	Ala	Met	Cys	Phe		
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Met	Met	Asp	Pro	Leu	Leu	Gly	Lys	Lys	Val	Cys	Tyr	Val	Gln	Phe	Pro		
			580					585					590				
Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	His	Asp	Arg	Tyr	Ala	Asn	Arg	Asn		
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Val	Val	Phe	Phe	Asp	Ile	Asn	Met	Lys	Gly	Leu	Asp	Gly	Ile	Gln	Gly		
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Pro	Ile	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Arg	Arg	Gln	Ala	Leu	Tyr		
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Gly	Tyr	Asp	Ala	Pro	Lys	Thr	Lys	Lys	Pro	Pro	Ser	Arg	Thr	Cys	Asn		
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Cys	Trp	Pro	Lys	Trp	Cys	Phe	Cys	Cys	Cys	Cys	Phe	Gly	Asn	Arg	Lys		
			660					665					670				
Gln	Lys	Lys	Thr	Thr	Lys	Pro	Lys	Thr	Glu	Lys	Lys	Lys	Leu	Leu	Phe		
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Phe	Lys	Lys	Glu	Glu	Asn	Gln	Ser	Pro	Ala	Tyr	Ala	Leu	Gly	Glu	Ile		
	690					695					700						
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705					710					715					720		
Gln	Gln	Lys	Leu	Glu	Lys	Lys	Phe	Gly	Gln	Ser	Ser	Val	Phe	Val	Thr		
				725					730					735			
Ser	Thr	Leu	Leu	Glu	Asn	Gly	Gly	Thr	Leu	Lys	Ser	Ala	Ser	Pro	Ala		
			740					745					750				
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	770					775					780						
Glu	Asp	Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Cys	His	Gly	Trp	Arg	Ser		
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Ile	Tyr	Cys	Ile	Pro	Lys	Arg	Val	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Leu	805	810	815
Asn	Leu	Ser	Asp	Arg	Leu	His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	820	825	830
Ile	Glu	Ile	Phe	Phe	Ser	Asn	His	Cys	Pro	Leu	Trp	Tyr	Gly	Tyr	Gly	835	840	845
Gly	Gly	Leu	Lys	Phe	Leu	Glu	Arg	Phe	Ser	Tyr	Ile	Asn	Ser	Ile	Val	850	855	860
Tyr	Pro	Trp	Thr	Ser	Ile	Pro	Leu	Leu	Ala	Tyr	Cys	Thr	Leu	Pro	Ala	865	870	875
Ile	Cys	Leu	Leu	Thr	Gly	Lys	Phe	Ile	Thr	Pro	Glu	Leu	Asn	Asn	Val	885	890	895
Ala	Ser	Leu	Trp	Phe	Met	Ser	Leu	Phe	Ile	Cys	Ile	Phe	Ala	Thr	Ser	900	905	910
Ile	Leu	Glu	Met	Arg	Trp	Ser	Gly	Val	Gly	Ile	Asp	Asp	Trp	Trp	Arg	915	920	925
Asn	Glu	Gln	Phe	Trp	Val	Ile	Gly	Gly	Val	Ser	Ser	His	Leu	Phe	Ala	930	935	940
Val	Phe	Gln	Gly	Leu	Leu	Lys	Val	Ile	Ala	Gly	Val	Asp	Thr	Ser	Phe	945	950	955
Thr	Val	Thr	Ser	Lys	Gly	Gly	Asp	Asp	Glu	Glu	Phe	Ser	Glu	Leu	Tyr	965	970	975
Thr	Phe	Lys	Trp	Thr	Thr	Leu	Leu	Ile	Pro	Pro	Thr	Thr	Leu	Leu	Leu	980	985	990
Leu	Asn	Phe	Ile	Gly	Val	Val	Ala	Gly	Val	Ser	Asn	Ala	Ile	Asn	Asn	995	1000	1005
Gly	Tyr	Glu	Ser	Trp	Gly	Pro	Leu	Phe	Gly	Lys	Leu	Phe	Phe	Ala	Phe	1010	1015	1020
Trp	Val	Ile	Val	His	Leu	Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Val	Gly	Arg	1025	1030	1035
Gln	Asn	Arg	Thr	Pro	Thr	Ile	Val	Ile	Val	Trp	Ser	Ile	Leu	Leu	Ala	1045	1050	1055
Ser	Ile	Phe	Ser	Leu	Leu	Trp	Val	Arg	Ile	Asp	Pro	Phe	Leu	Ala	Lys	1060	1065	1070
Asp	Asp	Gly	Pro	Leu	Leu	Glu	Glu	Cys	Gly	Leu	Asp	Cys	Asn			1075	1080	1085

<210> 11
 <211> 1138
 <212> DNA
 <213> Oryza sativa

<400> 11

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 1138

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 <211> 341
 <212> PRT
 <213> *Oryza sativa*

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 35 40 45
 Ala Gly Ala Glu Val Thr Arg Asn Ala Val Val Glu Ala Ala Arg Phe
 50 55 60
 Ala Ala Leu Trp Val Ser Phe Cys Arg Lys His Gly Val Glu Pro Arg
 65 70 75 80

Asn Leu Glu Ala Tyr Phe Asn Ala Gly Glu Gly Gly Gly Gly Lys Ala
 85 90 95
 Lys Val Val Ala Arg Gly Ser Tyr Arg Gly Met Ala Trp Pro Glu Leu
 100 105 110
 Val Arg Asp Arg Arg Arg Val Arg Arg Glu Tyr Glu Glu Met Arg Leu
 115 120 125
 Arg Ile Asp Ala Leu Gln Ala Ala Asp Ala Arg Arg Arg Arg Arg Gly
 130 135 140
 Ala Ala Asp Asp His Ala Gly Val Val Gln Val Leu Ile Asp Phe Ala
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 Gly Ser Val Pro Gln Leu Gly Val Ala Asn Gly Ser Lys Leu Ile Asp
 165 170 175
 Val Ala Ser Val Asp Val Cys Leu Pro Ala Leu Val Tyr Val Cys Arg
 180 185 190
 Glu Lys Arg Arg Gly His Ala His His Arg Lys Ala Gly Ala Met Asn
 195 200 205
 Ala Pro Phe Ile Leu Asp Leu Asp Cys Asp Tyr Tyr Val Asn Asn Ser
 210 215 220
 Gln Ala Leu Arg Ala Gly Ile Cys Phe Met Ile Glu Arg Gly Gly Gly
 225 230 235 240
 Gly Ala Ala Glu Asp Ala Gly Ala Val Ala Phe Val Gln Phe Pro Gln
 245 250 255
 Arg Val Asp Gly Val Asp Pro Gly Asp Arg Tyr Ala Asn His Asn Arg
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 Val Leu Phe Asp Cys Thr Glu Leu Gly Leu Asp Gly Leu Gln Gly Pro
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 Ile Tyr Val Gly Thr Gly Cys Leu Phe Arg Arg Val Ala Leu Tyr Ser
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 Val Asp Leu Pro Arg Trp Arg Pro Arg Arg Ser Leu Gly Cys Arg Leu
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<211> 3517

<212> DNA

<213> Glycine max

<400> 13

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 <212> PRT
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<220>

<221> UNSURE

<222> (201)

<223> Xaa = any amino acid

<400> 14

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			20					25					30			
Asp	Gly	Gln	Val	Cys	Glu	Ile	Cys	Gly	Asp	Gly	Val	Gly	Leu	Thr	Val	
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Asp	Gly	Asp	Leu	Phe	Val	Ala	Cys	Asn	Glu	Cys	Gly	Phe	Pro	Val	Cys	
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Arg	Pro	Cys	Tyr	Glu	Tyr	Glu	Arg	Arg	Glu	Gly	Ser	His	Leu	Cys	Pro	
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Gln	Cys	Lys	Thr	Arg	Tyr	Lys	Arg	Leu	Lys	Gly	Ser	Pro	Arg	Val	Glu	
				85					90					95		
Gly	Asp	Asp	Asp	Glu	Glu	Asp	Val	Asp	Asp	Ile	Glu	His	Glu	Phe	Asn	
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Ile	Asp	Glu	Gln	Lys	Asn	Lys	His	Gly	Gln	Val	Ala	Glu	Ala	Met	Leu	
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His	Gly	Arg	Met	Ser	Tyr	Gly	Arg	Gly	Pro	Glu	Asp	Asp	Asp	Asn	Ser	
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Gln	Phe	Pro	Thr	Pro	Val	Ile	Ala	Gly	Gly	Arg	Ser	Arg	Pro	Val	Ser	
145					150					155					160	
Gly	Glu	Phe	Pro	Ile	Ser	Ser	Asn	Ala	Tyr	Gly	Asp	Gln	Met	Leu	Ser	
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Ser	Ser	Leu	His	Lys	Arg	Val	His	Pro	Tyr	Pro	Val	Ser	Glu	Pro	Gly	
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Ser	Ala	Arg	Trp	Asp	Glu	Lys	Lys	Xaa	Asp	Gly	Trp	Lys	Asp	Arg	Met	
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Asp	Asp	Trp	Lys	Leu	Gln	Gln	Gly	Asn	Leu	Gly	Pro	Glu	Pro	Asp	Glu	
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Asp	Pro	Asp	Ala	Ala	Met	Leu	Asp	Glu	Ala	Arg	Gln	Pro	Leu	Ser	Arg	
225					230					235					240	
Lys	Val	Pro	Ile	Ala	Ser	Ser	Lys	Ile	Asn	Pro	Tyr	Arg	Met	Val	Ile	
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Val	Ala	Arg	Leu	Val	Ile	Leu	Ala	Phe	Phe	Leu	Arg	Tyr	Arg	Leu	Met	
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Asn	Pro	Val	His	Asp	Ala	Leu	Gly	Leu	Trp	Leu	Thr	Ser	Ile	Ile	Cys	
		275					280					285				

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 305 310 315 320
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 325 330 335
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 Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Asp Lys Ile Ser Cys
 355 360 365
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 370 375 380
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 Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val
 435 440 445
 Ala Lys Ala Gln Lys Val Pro Gln Gly Gly Trp Ile Met Gln Asp Gly
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 Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile Gln
 465 470 475 480
 Val Phe Leu Gly Ser Ser Gly Gly Leu Asp Thr Glu Gly Asn Gln Leu
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 Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln His
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 His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ser Ala Val
 515 520 525
 Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr Val
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 Gly Ile Asp Thr His Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe Phe
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 595 600 605

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775

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<213> *Triticum aestivum*

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<222> (262)

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<213> *Triticum aestivum*

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Pro	Lys	Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	Leu	Ser	Asp	
225					230					235					240	
Arg	Leu	Asn	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	Glu	Ile	Leu	
				245					250					255		
Phe	Ser	Arg	His	Cys	Pro	Leu	Trp	Tyr	Gly	Tyr	Gly	Gly	Arg	Leu	Lys	
			260					265					270			
Phe	Leu	Glu	Arg	Phe	Ala	Tyr	Ile	Asn	Thr	Thr	Ile	Tyr	Pro	Leu	Thr	
		275					280					285				
Ser	Leu	Pro	Leu	Leu	Val	Tyr	Cys	Ile	Leu	Pro	Ala	Ile	Cys	Leu	Leu	
	290					295					300					
Thr	Gly	Lys	Phe	Ile	Met	Pro	Glu	Ile	Ser	Asn	Leu	Ala	Ser	Ile	Trp	
305					310					315					320	

Phe Ile Ala Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile Leu Glu Met
325 330 335
Arg Trp Ser Gly Val Gly Ile Asp Glu Trp Trp Arg Asn Glu Gln Phe
340 345 350
Trp Val Ile Gly Gly Ile Ser Ala His Leu Phe Ala Val Phe Gln Gly
355 360 365
Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser
370 375 380
Lys Ala Asn Asp Glu Glu Gly Asp Phe Ala Glu Leu Tyr Met Phe Lys
385 390 395 400
Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Ile Leu Ile Ile Asn Met
405 410 415
Val Gly Val Val Ala Gly Thr Ser Tyr Ala Ile Asn Ser Gly Tyr Gln
420 425 430
Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe Trp Val Ile
435 440 445
Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg Gln Asn Arg
450 455 460
Thr Pro Thr Ile Val Ile Val Trp Ala Val Leu Leu Ala Ser Ile Phe
465 470 475 480
Ser Leu Leu Trp Val Arg Val Asp Pro Phe Thr Thr Arg Leu Ala Gly
485 490 495
Pro Asn Ile Gln Thr Cys Gly Ile Asn Cys
500 505

<210> 21
<211> 1029
<212> DNA
<213> *Triticum aestivum*

<400> 21
gcacgagccg ctcctcacca acggccagat ggttgatgac atcccgccgg agcagcacgc
60
gctcgtgccg tctacatga gcggcgccgg cggcgggggc aagaggatcc acccgctccc
120
tttcgcagat cccaaccttc cagtgcacc gagatccatg gaccgtcca aggatctggc
180
cgcctacgga tatggcagcg tggcctggaa ggagagaatg gagggctgga agcagaagca
240
ggagcgctg cagcatgtca ggagcgaggg tggcggtgat tgggatggcg acgatgcaga
300
tctgccacta atggatgaag ctaggcagcc attgtccaga aaagtcccta tatcatcaag
360
ccgaattaat ccctacagga tgattatcgt tatccggttg gtgggttttg gtttcttctt
420
ccactaccga gtgatgcac cggcgaaaga tgcatttgca ttgtggctca tatctgtaat
480
ctgtgaaatc tgggttgcca tgtcctgtat tcttgatcag ttcccaaagt ggtttccaat
540

cgagagagag acttacctgg accgtttgtc actaagggtt gacaaggaag gtcaaccctc
 600
 tcagcttgct ccaatcgact tctttgtcag tacggttgat cccacaaagg aacctccctt
 660
 ggtcacagcg aacactgtcc tttccatcct ttctgtggat tatccggttg agaaggtctc
 720
 ctgctatgtt tctgatgatg gtgctgcaat gcttacgttt gaagcattgt ctgaaacatc
 780
 tgaatttgca aagaaatggg ttcctttcag caaaaagttt aatatcgagc ctcgtgctcc
 840
 tgagtgttac ttccaacaga agatagacta cctgaaagac aaggttgctg cttcatttgt
 900
 tagggagagg agggcgatga agagagaata cgaggaattc aaggtaagga tcaatgcctt
 960
 gggtgcaaaa gcccaaaagg ttcctgagga aggatggaca atgcaagatg gaagcccctg
 1020
 gcctggaaa
 1029

<210> 22
 <211> 340
 <212> PRT
 <213> Triticum aestivum

<400> 22
 Pro Leu Leu Thr Asn Gly Gln Met Val Asp Asp Ile Pro Pro Glu Gln
 1 5 10 15
 His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly Gly Gly Gly Lys
 20 25 30
 Arg Ile His Pro Leu Pro Phe Ala Asp Pro Asn Leu Pro Val Gln Pro
 35 40 45
 Arg Ser Met Asp Pro Ser Lys Asp Leu Ala Ala Tyr Gly Tyr Gly Ser
 50 55 60
 Val Ala Trp Lys Glu Arg Met Glu Gly Trp Lys Gln Lys Gln Glu Arg
 65 70 75 80
 Leu Gln His Val Arg Ser Glu Gly Gly Gly Asp Trp Asp Gly Asp Asp
 85 90 95
 Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg Lys
 100 105 110
 Val Pro Ile Ser Ser Ser Arg Ile Asn Pro Tyr Arg Met Ile Ile Val
 115 120 125
 Ile Arg Leu Val Val Leu Gly Phe Phe Phe His Tyr Arg Val Met His
 130 135 140
 Pro Ala Lys Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys Glu
 145 150 155 160
 Ile Trp Phe Ala Met Ser Cys Ile Leu Asp Gln Phe Pro Lys Trp Phe
 165 170 175
 Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg Phe Asp
 180 185 190

Lys Glu Gly Gln Pro Ser Gln Leu Ala Pro Ile Asp Phe Phe Val Ser
 195 200 205
 Thr Val Asp Pro Thr Lys Glu Pro Pro Leu Val Thr Ala Asn Thr Val
 210 215 220
 Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Glu Lys Val Ser Cys Tyr
 225 230 235 240
 Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu Ala Leu Ser Glu
 245 250 255
 Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Ser Lys Lys Phe Asn
 260 265 270
 Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln Gln Lys Ile Asp Tyr
 275 280 285
 Leu Lys Asp Lys Val Ala Ala Ser Phe Val Arg Glu Arg Arg Ala Met
 290 295 300
 Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala
 305 310 315 320
 Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly Ser
 325 330 335
 Pro Trp Pro Gly
 340

<210> 23
 <211> 1081
 <212> PRT
 <213> Arabidopsis thaliana

<400> 23
 Met Glu Ala Ser Ala Gly Leu Val Ala Gly Ser Tyr Arg Arg Asn Glu
 1 5 10 15
 Leu Val Arg Ile Arg His Glu Ser Asp Gly Gly Thr Lys Pro Leu Lys
 20 25 30
 Asn Met Asn Gly Gln Ile Cys Gln Ile Cys Gly Asp Asp Val Gly Leu
 35 40 45
 Ala Glu Thr Gly Asp Val Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60
 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Lys Asp Gly Thr Gln Cys
 65 70 75 80
 Cys Pro Gln Cys Lys Thr Arg Phe Arg Arg His Arg Gly Ser Pro Arg
 85 90 95
 Val Glu Gly Asp Glu Asp Glu Asp Asp Val Asp Asp Ile Glu Asn Glu
 100 105 110
 Phe Asn Tyr Ala Gln Gly Ala Asn Lys Ala Arg His Gln Arg His Gly
 115 120 125

Glu Glu Phe Ser Ser Ser Ser Arg His Glu Ser Gln Pro Ile Pro Leu
 130 135 140
 Leu Thr His Gly His Thr Val Ser Gly Glu Ile Arg Thr Pro Asp Thr
 145 150 155 160
 Gln Ser Val Arg Thr Thr Ser Gly Pro Leu Gly Pro Ser Asp Arg Asn
 165 170 175
 Ala Ile Ser Ser Pro Tyr Ile Asp Pro Arg Gln Pro Val Pro Val Arg
 180 185 190
 Ile Val Asp Pro Ser Lys Asp Leu Asn Ser Tyr Gly Leu Gly Asn Val
 195 200 205
 Asp Trp Lys Glu Arg Val Glu Gly Trp Lys Leu Lys Gln Glu Lys Asn
 210 215 220
 Met Leu Gln Met Thr Gly Lys Tyr His Glu Gly Lys Gly Gly Glu Ile
 225 230 235 240
 Glu Gly Thr Gly Ser Asn Gly Glu Glu Leu Gln Met Ala Asp Asp Thr
 245 250 255
 Arg Leu Pro Met Ser Arg Val Val Pro Ile Pro Ser Ser Arg Leu Thr
 260 265 270
 Pro Tyr Arg Val Val Ile Ile Leu Arg Leu Ile Ile Leu Cys Phe Phe
 275 280 285
 Leu Gln Tyr Arg Thr Thr His Pro Val Lys Asn Ala Tyr Pro Leu Trp
 290 295 300
 Leu Thr Ser Val Ile Cys Glu Ile Trp Phe Ala Phe Ser Trp Leu Leu
 305 310 315 320
 Asp Gln Phe Pro Lys Trp Tyr Pro Ile Asn Arg Glu Thr Tyr Leu Asp
 325 330 335
 Arg Leu Ala Ile Arg Tyr Asp Arg Asp Gly Glu Pro Ser Gln Leu Val
 340 345 350
 Pro Val Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro
 355 360 365
 Leu Val Thr Ala Asn Thr Val Leu Ser Ile Leu Ser Val Asp Tyr Pro
 370 375 380
 Val Asp Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ser Ala Met Leu
 385 390 395 400
 Thr Phe Glu Ser Leu Ser Glu Thr Ala Glu Phe Ala Lys Lys Trp Val
 405 410 415
 Pro Phe Cys Lys Lys Phe Asn Ile Glu Pro Arg Ala Pro Glu Phe Tyr
 420 425 430
 Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Ile Gln Pro Ser Phe
 435 440 445

Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu Thr Gly
 770 775 780
 Phe Lys Met His Ala Arg Gly Trp Ile Ser Ile Tyr Cys Asn Pro Pro
 785 790 795 800
 Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu
 805 810 815
 Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Ile Glu Ile Leu Leu Ser
 820 825 830
 Arg His Cys Pro Ile Trp Tyr Gly Tyr His Gly Arg Leu Arg Leu Leu
 835 840 845
 Glu Arg Ile Ala Tyr Ile Asn Thr Ile Val Tyr Pro Ile Thr Ser Ile
 850 855 860
 Pro Leu Ile Ala Tyr Cys Ile Leu Pro Ala Phe Cys Leu Ile Thr Asp
 865 870 875 880
 Arg Phe Ile Ile Pro Glu Ile Ser Asn Tyr Ala Ser Ile Trp Phe Ile
 885 890 895
 Leu Leu Phe Ile Ser Ile Ala Val Thr Gly Ile Leu Glu Leu Arg Trp
 900 905 910
 Ser Gly Val Ser Ile Glu Asp Trp Trp Arg Asn Glu Gln Phe Trp Val
 915 920 925
 Ile Gly Gly Thr Ser Ala His Leu Phe Ala Val Phe Gln Gly Leu Leu
 930 935 940
 Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala
 945 950 955 960
 Thr Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr Ile Phe Lys Trp Thr
 965 970 975
 Ala Leu Leu Ile Pro Pro Thr Thr Val Leu Leu Val Asn Leu Ile Gly
 980 985 990
 Ile Val Ala Gly Val Ser Tyr Ala Val Asn Ser Gly Tyr Gln Ser Trp
 995 1000 1005
 Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Leu Trp Val Ile Ala His
 1010 1015 1020
 Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Arg Gln Asn Arg Thr Pro
 1025 1030 1035 1040
 Thr Ile Val Ile Val Trp Ser Val Leu Leu Ala Ser Ile Phe Ser Leu
 1045 1050 1055
 Leu Trp Val Arg Ile Asn Pro Phe Val Asp Ala Asn Pro Asn Ala Asn
 1060 1065 1070
 Asn Phe Asn Gly Lys Gly Gly Val Phe
 1075 1080

<210> 24
 <211> 1084
 <212> PRT
 <213> Arabidopsis thaliana

<400> 24
 Met Asn Thr Gly Gly Arg Leu Ile Ala Gly Ser His Asn Arg Asn Glu
 1 5 10 15
 Phe Val Leu Ile Asn Ala Asp Glu Ser Ala Arg Ile Arg Ser Val Gln
 20 25 30
 Glu Leu Ser Gly Gln Thr Cys Gln Ile Cys Gly Asp Glu Ile Glu Leu
 35 40 45
 Thr Val Ser Ser Glu Leu Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60
 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala
 65 70 75 80
 Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Ile Lys Gly Ser Pro Arg
 85 90 95
 Val Asp Gly Asp Asp Glu Glu Glu Glu Asp Ile Asp Asp Leu Glu Tyr
 100 105 110
 Glu Phe Asp His Gly Met Asp Pro Glu His Ala Ala Glu Ala Ala Leu
 115 120 125
 Ser Ser Arg Leu Asn Thr Gly Arg Gly Gly Leu Asp Ser Ala Pro Pro
 130 135 140
 Gly Ser Gln Ile Pro Leu Leu Thr Tyr Cys Asp Glu Asp Ala Asp Met
 145 150 155 160
 Tyr Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Thr Gly Tyr Gly
 165 170 175
 Asn Arg Val Tyr Pro Ala Pro Phe Thr Asp Ser Ser Ala Pro Pro Gln
 180 185 190
 Ala Arg Ser Met Val Pro Gln Lys Asp Ile Ala Glu Tyr Gly Tyr Gly
 195 200 205
 Ser Val Ala Trp Lys Asp Arg Met Glu Val Trp Lys Arg Arg Gln Gly
 210 215 220
 Glu Lys Leu Gln Val Ile Lys His Glu Gly Gly Asn Asn Gly Arg Gly
 225 230 235 240
 Ser Asn Asp Asp Asp Glu Leu Asp Asp Pro Asp Met Pro Met Met Asp
 245 250 255
 Glu Gly Arg Gln Pro Leu Ser Arg Lys Leu Pro Ile Arg Ser Ser Arg
 260 265 270
 Ile Asn Pro Tyr Arg Met Leu Ile Leu Cys Arg Leu Ala Ile Leu Gly
 275 280 285

Leu Phe Phe His Tyr Arg Ile Leu His Pro Val Asn Asp Ala Tyr Gly
 290 295 300
 Leu Trp Leu Thr Ser Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp
 305 310 315 320
 Ile Leu Asp Gln Phe Pro Lys Trp Tyr Pro Ile Glu Arg Glu Thr Tyr
 325 330 335
 Leu Asp Arg Leu Ser Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Gly
 340 345 350
 Leu Ala Pro Val Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu
 355 360 365
 Pro Pro Leu Ile Thr Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp
 370 375 380
 Tyr Pro Val Asp Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala
 385 390 395 400
 Met Leu Thr Phe Glu Ala Leu Ser Asp Thr Ala Glu Phe Ala Arg Lys
 405 410 415
 Trp Val Pro Phe Cys Lys Lys Phe Asn Ile Glu Pro Arg Ala Pro Glu
 420 425 430
 Trp Tyr Phe Ser Gln Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro
 435 440 445
 Ala Phe Val Arg Glu Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe
 450 455 460
 Lys Val Lys Ile Asn Ala Leu Val Ala Thr Ala Gln Lys Val Pro Glu
 465 470 475 480
 Glu Gly Trp Thr Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Val
 485 490 495
 Arg Asp His Pro Gly Met Ile Gln Val Phe Leu Gly His Ser Gly Val
 500 505 510
 Arg Asp Thr Asp Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg
 515 520 525
 Glu Lys Arg Pro Gly Phe Asp His His Lys Lys Ala Gly Ala Met Asn
 530 535 540
 Ser Leu Ile Arg Val Ser Ala Val Leu Ser Asn Ala Pro Tyr Leu Leu
 545 550 555 560
 Asn Val Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Ile Arg Glu
 565 570 575
 Ser Met Cys Phe Met Met Asp Pro Gln Ser Gly Lys Lys Val Cys Tyr
 580 585 590
 Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr
 595 600 605

Ser Asn Arg Asn Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp
 610 615 620
 Gly Ile Gln Gly Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg
 625 630 635 640
 Gln Ala Leu Tyr Gly Phe Asp Ala Pro Lys Lys Lys Lys Pro Pro Gly
 645 650 655
 Lys Thr Cys Asn Cys Trp Pro Lys Trp Cys Cys Leu Cys Cys Gly Leu
 660 665 670
 Arg Lys Lys Ser Lys Thr Lys Ala Lys Asp Lys Lys Thr Asn Thr Lys
 675 680 685
 Glu Thr Ser Lys Gln Ile His Ala Leu Glu Asn Val Asp Glu Gly Val
 690 695 700
 Ile Val Pro Val Ser Asn Val Glu Lys Arg Ser Glu Ala Thr Gln Leu
 705 710 715 720
 Lys Leu Glu Lys Lys Phe Gly Gln Ser Pro Val Phe Val Ala Ser Ala
 725 730 735
 Val Leu Gln Asn Gly Gly Val Pro Arg Asn Ala Ser Pro Ala Cys Leu
 740 745 750
 Leu Arg Glu Ala Ile Gln Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr
 755 760 765
 Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp
 770 775 780
 Ile Leu Thr Gly Phe Lys Met His Cys His Gly Trp Arg Ser Val Tyr
 785 790 795 800
 Cys Met Pro Lys Arg Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu
 805 810 815
 Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu
 820 825 830
 Ile Phe Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly
 835 840 845
 Leu Lys Trp Leu Glu Arg Phe Ser Tyr Ile Asn Ser Val Val Tyr Pro
 850 855 860
 Trp Thr Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Val Cys
 865 870 875 880
 Leu Leu Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Gly
 885 890 895
 Ile Leu Phe Met Leu Met Phe Ile Ser Ile Ala Val Thr Gly Ile Leu
 900 905 910
 Glu Met Gln Trp Gly Gly Val Gly Ile Asp Asp Trp Trp Arg Asn Glu
 915 920 925

Gln Phe Trp Val Ile Gly Gly Ala Ser Ser His Leu Phe Ala Leu Phe
 930 935 940

Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val
 945 950 955 960

Thr Ser Lys Ala Ala Asp Asp Gly Ala Phe Ser Glu Leu Tyr Ile Phe
 965 970 975

Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile Ile Asn
 980 985 990

Ile Ile Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr
 995 1000 1005

Asp Ser Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val
 1010 1015 1020

Ile Val His Leu Tyr Pro Phe Leu Lys Gly Met Leu Gly Lys Gln Asp
 1025 1030 1035 1040

Lys Met Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile
 1045 1050 1055

Leu Thr Leu Leu Trp Val Arg Val Asn Pro Phe Val Ala Lys Gly Gly
 1060 1065 1070

Pro Val Leu Glu Ile Cys Gly Leu Asn Cys Gly Asn
 1075 1080

<210> 25
 <211> 685
 <212> PRT
 <213> Gossypium hirsutum

<400> 25
 Arg Arg Trp Val Pro Phe Cys Lys Lys His Asn Val Glu Pro Arg Ala
 1 5 10 15

Pro Glu Phe Tyr Phe Asn Glu Lys Ile Asp Tyr Leu Lys Asp Lys Val
 20 25 30

His Pro Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu
 35 40 45

Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala Lys Ala Gln Lys Lys
 50 55 60

Pro Glu Glu Gly Trp Val Met Gln Asp Gly Thr Pro Trp Pro Gly Asn
 65 70 75 80

Asn Thr Arg Asp His Pro Gly Met Ile Gln Val Tyr Leu Gly Ser Ala
 85 90 95

Gly Ala Leu Asp Val Asp Gly Lys Glu Leu Pro Arg Leu Val Tyr Val
 100 105 110

Ser Arg Glu Lys Arg Pro Gly Tyr Gln His His Lys Lys Ala Gly Ala
 115 120 125

Glu	Asn	Ala	Leu	Val	Arg	Val	Ser	Ala	Val	Leu	Thr	Asn	Ala	Pro	Phe	130	135	140
Ile	Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Met	145	150	155
Arg	Glu	Ala	Met	Cys	Phe	Leu	Met	Asp	Pro	Gln	Phe	Gly	Lys	Lys	Leu	165	170	175
Cys	Tyr	Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	His	Asp	180	185	190
Arg	Tyr	Ala	Asn	Arg	Asn	Val	Val	Phe	Phe	Asp	Ile	Asn	Met	Leu	Gly	195	200	205
Leu	Asp	Gly	Leu	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	210	215	220
Asn	Arg	Gln	Ala	Leu	Tyr	Gly	Tyr	Asp	Pro	Pro	Val	Ser	Glu	Lys	Arg	225	230	235
Pro	Lys	Met	Thr	Cys	Asp	Cys	Trp	Pro	Ser	Trp	Cys	Cys	Cys	Cys	Cys	245	250	255
Gly	Gly	Ser	Arg	Lys	Lys	Ser	Lys	Lys	Lys	Gly	Glu	Lys	Lys	Gly	Leu	260	265	270
Leu	Gly	Gly	Leu	Leu	Tyr	Gly	Lys	Lys	Lys	Lys	Met	Met	Gly	Lys	Asn	275	280	285
Tyr	Val	Lys	Lys	Gly	Ser	Ala	Pro	Val	Phe	Asp	Leu	Glu	Glu	Ile	Glu	290	295	300
Glu	Gly	Leu	Glu	Gly	Tyr	Glu	Glu	Leu	Glu	Lys	Ser	Thr	Leu	Met	Ser	305	310	315
Gln	Lys	Asn	Phe	Glu	Lys	Arg	Phe	Gly	Gln	Ser	Pro	Val	Phe	Ile	Ala	325	330	335
Ser	Thr	Leu	Met	Glu	Asn	Gly	Gly	Leu	Pro	Glu	Gly	Thr	Asn	Ser	Thr	340	345	350
Ser	Leu	Ile	Lys	Glu	Ala	Ile	His	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Glu	355	360	365
Lys	Thr	Glu	Trp	Gly	Lys	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	370	375	380
Glu	Asp	Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Cys	Arg	Gly	Trp	Lys	Ser	385	390	395
Val	Tyr	Cys	Val	Pro	Lys	Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	405	410	415
Asn	Leu	Ser	Asp	Arg	Leu	His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	420	425	430
Val	Glu	Ile	Phe	Leu	Ser	Arg	His	Cys	Pro	Leu	Trp	Tyr	Gly	Tyr	Gly	435	440	445

Gly Lys Leu Lys Trp Leu Glu Arg Leu Ala Tyr Ile Asn Thr Ile Val
 450 455 460
 Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro Ala
 465 470 475 480
 Val Cys Leu Leu Thr Gly Lys Phe Ile Ile Pro Thr Leu Ser Asn Leu
 485 490 495
 Thr Ser Val Trp Phe Leu Ala Leu Phe Leu Ser Ile Ile Ala Thr Gly
 500 505 510
 Val Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Gln Asp Trp Trp Arg
 515 520 525
 Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala
 530 535 540
 Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe
 545 550 555 560
 Thr Val Thr Ala Lys Ala Ala Asp Asp Thr Glu Phe Gly Glu Leu Tyr
 565 570 575
 Leu Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Ile Ile
 580 585 590
 Leu Asn Met Val Gly Val Val Ala Gly Val Ser Asp Ala Ile Asn Asn
 595 600 605
 Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
 610 615 620
 Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg
 625 630 635 640
 Gln Asn Arg Thr Pro Thr Ile Val Val Leu Trp Ser Ile Leu Leu Ala
 645 650 655
 Ser Ile Phe Ser Leu Val Trp Val Arg Ile Asp Pro Phe Leu Pro Lys
 660 665 670
 Gln Thr Gly Pro Val Leu Lys Gln Cys Gly Val Glu Cys
 675 680 685

<210> 26

<211> 1111

<212> PRT

<213> Arabidopsis thaliana

<400> 26

Met Ala Ser Thr Pro Pro Gln Thr Ser Lys Lys Val Arg Asn Asn Ser
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Gly Ser Gly Gln Thr Val Lys Phe Ala Arg Arg Thr Ser Ser Gly Arg
 20 25 30

Tyr Val Ser Leu Ser Arg Asp Asn Ile Glu Leu Ser Gly Glu Leu Ser
 35 40 45

Pro	Pro	Leu	Val	Thr	Ala	Asn	Thr	Ile	Leu	Ser	Ile	Leu	Ala	Val	Asp	370	375	380
Tyr	Pro	Val	Glu	Lys	Val	Ser	Cys	Tyr	Leu	Ser	Asp	Asp	Gly	Gly	Ala	385	390	395
Leu	Leu	Ser	Phe	Glu	Ala	Met	Ala	Glu	Ala	Ala	Ser	Phe	Ala	Asp	Leu	405	410	415
Trp	Val	Pro	Phe	Cys	Arg	Lys	His	Asn	Ile	Glu	Pro	Arg	Asn	Pro	Asp	420	425	430
Ser	Tyr	Phe	Ser	Leu	Lys	Ile	Asp	Pro	Thr	Lys	Asn	Lys	Ser	Arg	Ile	435	440	445
Asp	Phe	Val	Lys	Asp	Arg	Arg	Lys	Ile	Lys	Arg	Glu	Tyr	Asp	Glu	Phe	450	455	460
Lys	Val	Arg	Ile	Asn	Gly	Leu	Pro	Asp	Ser	Ile	Arg	Arg	Arg	Ser	Asp	465	470	475
Ala	Phe	Asn	Ala	Arg	Glu	Glu	Met	Lys	Ala	Leu	Lys	Gln	Met	Arg	Glu	485	490	495
Ser	Gly	Gly	Asp	Pro	Thr	Glu	Pro	Val	Lys	Val	Pro	Lys	Ala	Thr	Trp	500	505	510
Met	Ala	Asp	Gly	Thr	His	Trp	Pro	Gly	Thr	Trp	Ala	Ala	Ser	Thr	Arg	515	520	525
Glu	His	Ser	Lys	Gly	Asp	His	Ala	Gly	Ile	Leu	Gln	Val	Met	Leu	Lys	530	535	540
Pro	Pro	Ser	Ser	Asp	Pro	Leu	Ile	Gly	Asn	Ser	Asp	Asp	Lys	Val	Ile	545	550	555
Asp	Phe	Ser	Asp	Thr	Asp	Thr	Arg	Leu	Pro	Met	Phe	Val	Tyr	Val	Ser	565	570	575
Arg	Glu	Lys	Arg	Pro	Gly	Tyr	Asp	His	Asn	Lys	Lys	Ala	Gly	Ala	Met	580	585	590
Asn	Ala	Leu	Val	Arg	Ala	Ser	Ala	Ile	Leu	Ser	Asn	Gly	Pro	Phe	Ile	595	600	605
Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Ile	Tyr	Asn	Cys	Lys	Ala	Val	Arg	610	615	620
Glu	Gly	Met	Cys	Phe	Met	Met	Asp	Arg	Gly	Gly	Glu	Asp	Ile	Cys	Tyr	625	630	635
Ile	Gln	Phe	Pro	Gln	Arg	Phe	Glu	Gly	Ile	Asp	Pro	Ser	Asp	Arg	Tyr	645	650	655
Ala	Asn	Asn	Asn	Thr	Val	Phe	Phe	Asp	Gly	Asn	Met	Arg	Ala	Leu	Asp	660	665	670
Gly	Val	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Thr	Met	Phe	Arg	Arg	675	680	685

Phe Ala Leu Tyr Gly Phe Asp Pro Pro Asn Pro Asp Lys Leu Leu Glu
690 695 700
Lys Lys Glu Ser Glu Thr Glu Ala Leu Thr Thr Ser Asp Phe Asp Pro
705 710 715 720
Asp Leu Asp Val Thr Gln Leu Pro Lys Arg Phe Gly Asn Ser Thr Leu
725 730 735
Leu Ala Glu Ser Ile Pro Ile Ala Glu Phe Gln Gly Arg Pro Leu Ala
740 745 750
Asp His Pro Ala Val Lys Tyr Gly Arg Pro Pro Gly Ala Leu Arg Val
755 760 765
Pro Arg Asp Pro Leu Asp Ala Thr Thr Val Ala Glu Ser Val Ser Val
770 775 780
Ile Ser Cys Trp Tyr Glu Asp Lys Thr Glu Trp Gly Asp Arg Val Gly
785 790 795 800
Trp Ile Tyr Gly Ser Val Thr Glu Asp Val Val Thr Gly Tyr Arg Met
805 810 815
His Asn Arg Gly Trp Arg Ser Val Tyr Cys Ile Thr Lys Arg Asp Ser
820 825 830
Phe Arg Gly Ser Ala Pro Ile Asn Leu Thr Asp Arg Leu His Gln Val
835 840 845
Leu Arg Trp Ala Thr Gly Ser Val Glu Ile Phe Phe Ser Arg Asn Asn
850 855 860
Ala Ile Leu Ala Ser Lys Arg Leu Lys Phe Leu Gln Arg Leu Ala Tyr
865 870 875 880
Leu Asn Val Gly Ile Tyr Pro Phe Thr Ser Leu Phe Leu Ile Leu Tyr
885 890 895
Cys Phe Leu Pro Ala Phe Ser Leu Phe Ser Gly Gln Phe Ile Val Arg
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Thr Leu Ser Ile Ser Phe Leu Val Tyr Leu Leu Met Ile Thr Ile Cys
915 920 925
Leu Ile Gly Leu Ala Val Leu Glu Val Lys Trp Ser Gly Ile Gly Leu
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Glu Glu Trp Trp Arg Asn Glu Gln Trp Trp Leu Ile Ser Gly Thr Ser
945 950 955 960
Ser His Leu Tyr Ala Val Val Gln Gly Val Leu Lys Val Ile Ala Gly
965 970 975
Ile Glu Ile Ser Phe Thr Leu Thr Thr Lys Ser Gly Gly Asp Asp Asn
980 985 990
Glu Asp Ile Tyr Ala Asp Leu Tyr Ile Val Lys Trp Ser Ser Leu Met
995 1000 1005

Ile Pro Pro Ile Val Ile Ala Met Val Asn Ile Ile Ala Ile Val Val
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 1060 1065 1070
 Phe Val Trp Ala Gly Leu Ile Ala Ile Thr Ile Ser Leu Leu Trp Thr
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 35 40 45
 Glu Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Ala Cys
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 Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Thr Gln Asn Cys Pro
 65 70 75 80
 Gln Cys Lys Thr Arg Tyr Lys Arg Leu Arg Gly Ser Pro Arg Val Glu
 85 90 95
 Gly Asp Glu Asp Glu Glu Asp Ile Asp Asp Ile Glu Tyr Glu Phe Asn
 100 105 110
 Ile Glu His Glu Gln Asp Lys His Lys His Ser Ala Glu Ala Met Leu
 115 120 125
 Tyr Gly Lys Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Glu Asn Gly
 130 135 140
 Arg Phe Pro Pro Val Ile Ala Gly Gly His Ser Gly Glu Phe Pro Val
 145 150 155 160
 Gly Gly Gly Tyr Gly Asn Gly Glu His Gly Leu His Lys Arg Val His
 165 170 175

Pro Tyr Pro Ser Ser Glu Ala Gly Ser Glu Gly Gly Trp Arg Glu Arg
 180 185 190
 Met Asp Asp Trp Lys Leu Gln His Gly Asn Leu Gly Pro Glu Pro Asp
 195 200 205
 Asp Asp Pro Glu Met Gly Leu Ile Asp Glu Ala Arg Gln Pro Leu Ser
 210 215 220
 Arg Lys Val Pro Ile Ala Ser Ser Lys Ile Asn Pro Tyr Arg Met Val
 225 230 235 240
 Ile Val Ala Arg Leu Val Ile Leu Ala Val Phe Leu Arg Tyr Arg Leu
 245 250 255
 Leu Asn Pro Val His Asp Ala Leu Gly Leu Trp Leu Thr Ser Val Ile
 260 265 270
 Cys Glu Ile Trp Phe Ala Val Ser Trp Ile Leu Asp Gln Phe Pro Lys
 275 280 285
 Trp Phe Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg
 290 295 300
 Tyr Glu Arg Glu Gly Glu Pro Asn Met Leu Ala Pro Val Asp Val Phe
 305 310 315 320
 Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Val Thr Ser Asn
 325 330 335
 Thr Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Glu Lys Ile Ser
 340 345 350
 Cys Tyr Val Ser Asp Asp Gly Ala Ser Met Leu Thr Phe Glu Ser Leu
 355 360 365
 Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe Cys Lys Lys
 370 375 380
 Phe Ser Ile Glu Pro Arg Ala Pro Glu Met Tyr Phe Thr Leu Lys Val
 385 390 395 400
 Asp Tyr Leu Gln Asp Lys Val His Pro Thr Phe Val Lys Glu Arg Arg
 405 410 415
 Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Gln
 420 425 430
 Val Ala Lys Ala Ser Lys Val Pro Leu Glu Gly Trp Ile Met Gln Asp
 435 440 445
 Gly Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile
 450 455 460
 Gln Val Phe Leu Gly His Ser Gly Gly Phe Asp Val Glu Gly His Glu
 465 470 475 480
 Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln
 485 490 495

His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ala Gly
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 Val Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr
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 Val Asn Asn Ser Lys Ala Val Arg Glu Ala Met Cys Phe Leu Met Asp
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 Pro Gln Ile Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe
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 Asp Gly Ile Asp Thr Asn Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe
 565 570 575
 Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Val Tyr
 580 585 590
 Val Gly Thr Gly Cys Val Phe Lys Arg Gln Ala Leu Tyr Gly Tyr Glu
 595 600 605
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 610 615 620
 Pro Cys Phe Gly Arg Arg Arg Lys Asn Lys Lys Phe Ser Lys Asn Asp
 625 630 635 640
 Met Asn Gly Asp Val Ala Ala Leu Gly Gly Ala Glu Gly Asp Lys Glu
 645 650 655
 His Leu Met Phe Glu Met Asn Phe Glu Lys Thr Phe Gly Gln Ser Ser
 660 665 670
 Ile Phe Val Thr Ser Thr Leu Met Glu Glu Gly Gly Val Pro Pro Ser
 675 680 685
 Ser Ser Pro Ala Val Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys
 690 695 700
 Gly Tyr Glu Asp Lys Thr Glu Trp Gly Thr Glu Leu Gly Trp Ile Tyr
 705 710 715 720
 Gly Ser Ile Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg
 725 730 735
 Gly Trp Arg Ser Ile Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly
 740 745 750
 Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp
 755 760 765
 Ala Leu Gly Ser Val Glu Ile Phe Phe Ser Arg His Ser Pro Leu Trp
 770 775 780
 Tyr Gly Tyr Lys Gly Gly Lys Leu Lys Trp Leu Glu Arg Phe Ala Tyr
 785 790 795 800
 Ala Asn Thr Thr Ile Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr
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Cys Ile Leu Pro Ala Ile Cys Leu Leu Thr Asp Lys Phe Ile Met Pro
 820 825 830
 Pro Ile Ser Thr Phe Ala Ser Leu Phe Phe Ile Ser Leu Phe Met Ser
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 Ile Ile Val Thr Gly Ile Leu Glu Leu Arg Trp Ser Gly Val Ser Ile
 850 855 860
 Glu Glu Trp Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Ile Ser
 865 870 875 880
 Ala His Leu Phe Ala Val Val Gln Gly Leu Leu Lys Ile Leu Ala Gly
 885 890 895
 Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala Thr Asp Asp Asp
 900 905 910
 Phe Gly Glu Leu Tyr Ala Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro
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 Thr Thr Val Leu Ile Ile Asn Ile Val Gly Val Val Ala Gly Ile Ser
 930 935 940
 Asp Ala Ile Asn Asn Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys
 945 950 955 960
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 965 970 975
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 980 985 990
 Ser Val Leu Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp
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 35 40 45
 Glu Trp Tyr Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Gln
 50 55 60

Thr Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu
 65 70 75 80
 Phe Lys Val Arg Val Asn Gly Leu Val Ala Lys Ala Gln Lys Val Pro
 85 90 95
 Glu Glu Gly Trp Ile Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn
 100 105 110
 Thr Arg Asp His Pro Gly Met Ile Gln Val Phe Leu Gly Gln Ser Gly
 115 120 125
 Gly Leu Asp Ala Glu Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser
 130 135 140
 Arg Glu Lys Arg Pro Gly Phe Gln His His Lys Lys Ala Gly Ala Met
 145 150 155 160
 Asn Ala Leu Val Arg Val Ser Ala Val Leu Thr Asn Gly Ala Phe Leu
 165 170 175
 Leu Asn Leu Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Leu Arg
 180 185 190
 Glu Ala Met Cys Phe Leu Met Asp Pro Asn Leu Gly Lys Gln Val Cys
 195 200 205
 Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg Asn Asp Arg
 210 215 220
 Tyr Ala Asn Arg Asn Thr Val Phe Phe Asp Ile Asn Leu Arg Gly Leu
 225 230 235 240
 Asp Gly Ile Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe Asn
 245 250 255
 Arg Thr Ala Leu Tyr Gly Tyr Glu Pro Pro Leu Lys Pro Lys His Arg
 260 265 270
 Lys Thr Gly Ile Leu Ser Ser Leu Cys Gly Gly Ser Arg Lys Lys Ser
 275 280 285
 Ser Lys Ser Ser Lys Lys Gly Ser Asp Lys Lys Lys Ser Gly Lys His
 290 295 300
 Val Asp Ser Thr Val Pro Val Phe Asn Leu Glu Asp Ile Glu Glu Gly
 305 310 315 320
 Val Glu Gly Ala Gly Phe Asp Asp Glu Lys Ser Leu Leu Met Ser Gln
 325 330 335
 Met Ser Leu Glu Lys Arg Phe Gly Gln Ser Ala Val Phe Val Ala Ser
 340 345 350
 Thr Leu Met Glu Asn Gly Gly Val Pro Gln Ser Ala Thr Pro Glu Thr
 355 360 365
 Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys
 370 375 380

Thr Asp Trp Gly Ser Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu
 385 390 395 400
 Asp Ile Leu Thr Gly Phe Lys Met His Ala Arg Gly Trp Arg Ser Ile
 405 410 415
 Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn
 420 425 430
 Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Val
 435 440 445
 Glu Ile Leu Phe Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Ser Gly
 450 455 460
 Arg Leu Lys Trp Leu Glu Arg Phe Ala Tyr Val Asn Thr Thr Ile Tyr
 465 470 475 480
 Pro Val Thr Ala Ile Pro Leu Leu Met Tyr Cys Thr Leu Pro Ala Val
 485 490 495
 Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Gln Ile Ser Asn Leu Ala
 500 505 510
 Ser Ile Trp Phe Ile Ser Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile
 515 520 525
 Leu Lys Met Lys Trp Asn Gly Val Gly Ile Asp Gln Trp Trp Arg Asn
 530 535 540
 Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Val
 545 550 555 560
 Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr
 565 570 575
 Val Thr Ser Lys Ala Ser Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr
 580 585 590
 Met Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile
 595 600 605
 Ile Asn Leu Val Gly Val Val Ala Gly Ile Ser Tyr Val Ile Asn Ser
 610 615 620
 Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
 625 630 635 640
 Trp Val Ile Ile His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg
 645 650 655
 Gln Asn Arg Thr Pro Thr Ile Val Val Val Trp Ser Ile Leu Leu Ala
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<400> 29

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Gly	Glu	Pro	Phe	Val	Ala	Cys	Asn	Glu	Cys	Ala	Phe	Pro	Val	Cys	Arg
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Pro	Cys	Tyr	Glu	Tyr	Glu	Arg	Arg	Glu	Gly	Asn	Gln	Ala	Cys	Pro	Gln
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Cys	Lys	Thr	Arg	Phe	Lys	Arg	Leu	Lys	Gly	Ser	Pro	Arg	Val	Glu	Gly
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Asp	Glu	Glu	Glu	Asp	Asp	Ile	Asp	Asp	Leu	Asp	Asn	Glu	Phe	Glu	Tyr
			100					105					110		
Gly	Asn	Asn	Gly	Ile	Gly	Phe	Asp	Gln	Val	Ser	Glu	Gly	Met	Ser	Ile
	115						120					125			
Ser	Arg	Arg	Asn	Ser	Gly	Phe	Pro	Gln	Ser	Asp	Leu	Asp	Ser	Ala	Pro
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Pro	Gly	Ser	Gln	Ile	Pro	Leu	Leu	Thr	Tyr	Gly	Asp	Glu	Asp	Val	Glu
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Ile	Ser	Ser	Asp	Arg	His	Ala	Leu	Ile	Val	Pro	Pro	Ser	Leu	Gly	Gly
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His	Gly	Asn	Arg	Val	His	Pro	Val	Ser	Leu	Ser	Asp	Pro	Thr	Val	Ala
			180					185					190		
Ala	His	Arg	Arg	Leu	Met	Val	Pro	Gln	Lys	Asp	Leu	Ala	Val	Tyr	Gly
		195					200					205			
Tyr	Gly	Ser	Val	Ala	Trp	Lys	Asp	Arg	Met	Glu	Glu	Trp	Lys	Arg	Lys
	210					215					220				
Gln	Asn	Glu	Lys	Leu	Gln	Val	Val	Arg	His	Glu	Gly	Asp	Pro	Asp	Phe
225					230					235					240
Glu	Asp	Gly	Asp	Asp	Ala	Asp	Phe	Pro	Met	Met	Asp	Glu	Gly	Arg	Gln
				245					250					255	
Pro	Leu	Ser	Met	Lys	Ile	Pro	Ile	Lys	Ser	Ser	Lys	Ile	Asn	Pro	Tyr
			260					265					270		
Arg	Met	Leu	Ile	Val	Leu	Arg	Leu	Val	Ile	Leu	Gly	Leu	Phe	Phe	His
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Tyr Arg Ile Leu His Pro Val Lys Asp Ala Tyr Ala Leu Trp Leu Ile
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 Ser Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp Val Leu Asp Gln
 305 310 315 320
 Phe Pro Lys Trp Tyr Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu
 325 330 335
 Ser Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Gly Leu Ser Pro Val
 340 345 350
 Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Ile
 355 360 365
 Thr Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp
 370 375 380
 Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe
 385 390 395 400
 Glu Ala Leu Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe
 405 410 415
 Cys Lys Lys Tyr Cys Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Cys
 420 425 430
 His Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro Ala Phe Val Arg
 435 440 445
 Glu Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe Lys Val Lys Ile
 450 455 460
 Asn Ala Leu Val Ala Thr Ala Gln Lys Val Pro Glu Asp Gly Trp Thr
 465 470 475 480
 Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Ser Val Arg Asp His Pro
 485 490 495
 Gly Met Ile Gln Val Phe Leu Gly Ser Asp Gly Val Arg Asp Val Glu
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 Met Met Asp Pro Gln Ser Gly Lys Lys Ile Cys Tyr Val Gln Phe Pro
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 Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn
 595 600 605

Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Leu Gln Gly
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 Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr
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 755 760 765
 Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
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 Thr Gly Ser Lys Met His Ser His Gly Trp Arg His Val Tyr Cys Thr
 785 790 795 800
 Pro Lys Leu Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
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 Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys
 835 840 845
 Trp Leu Glu Arg Leu Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr
 850 855 860
 Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Ile Cys Leu Leu
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 Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Ile Leu
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 Gln Trp Gly Lys Val Gly Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe
 915 920 925

Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Leu Phe Gln Gly
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 Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe Thr Val Thr Ser
 945 950 955 960
 Lys Ala Ala Asp Asp Gly Glu Phe Ser Asp Leu Tyr Leu Phe Lys Trp
 965 970 975
 Thr Ser Leu Leu Ile Pro Pro Met Thr Leu Leu Ile Ile Asn Val Ile
 980 985 990
 Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr Asp Ser
 995 1000 1005
 Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val Ile Ile
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 His Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Lys Gln Asp Arg Met
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 Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile Leu Thr
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 Leu Leu Trp Val Arg Val Asn Pro Phe Val Ala Lys Gly Gly Pro Ile
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 Leu Glu Ile Cys Gly Leu Asp Cys Leu
 1075 1080